Architectural Thesis

TEXT

Architecture

B. S.

1909

UNIVERSITY
OF
ILL. LIBRARY

UNIVERSITY OF ILLINOIS
LIBRARY

Class 1909
Book Ar2
Volume

Ja09-20M

The person charging this material is responsible for its return to the library from which it was withdrawn on or before the **Latest Date** stamped below.

Theft, mutilation, and underlining of books are reasons for disciplinary action and may result in dismissal from the University.

UNIVERSITY OF ILLINOIS LIBRARY AT URBANA-CHAMPAIGN

BUILDING USE ONLY
SEP 30 1975
BUILDING USE ONLY
SEP 30 1975
SEP 30 1975

L161—O-1096

LIBRARY
UNIV. OF ILL.
URBANA

DESIGN FOR A GOVERNMENT PRINTING PLANT

BY

WILLIAM HERBERT BEYRER

THESIS

FOR THE

DEGREE OF BACHELOR OF SCIENCE

IN

ARCHITECTURE

IN THE

COLLEGE OF ENGINEERING

UNIVERSITY OF ILLINOIS

PRESENTED, JUNE, 1909

1909
St2

1909
Ar2

UNIVERSITY OF ILLINOIS

June 1, 1909

THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

WILLIAM HERBERT BEYRER

ENTITLED DESIGN FOR A GOVERNMENT PRINTING PLANT

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF Bachelor of Science in Architecture

John Watrous Case
Instructor in Charge

APPROVED: N. Clifford Ricker

HEAD OF DEPARTMENT OF Architecture

147258

UIUC

A GOVERNMENT PRINTING PLANT

The building that houses the Government Printing Office of the United States at present occupies a quarter-block, corner of Capitol St. and Seventh St., N. E., in the city of Washington. It has a height of seven stories and a basement, a frontage of 175 feet and a depth of 408 feet, and a total floor area of some 500,000 sq. feet. With the exception of a narrow light court, the whole site is occupied by the building. The construction is steel frame, fireproof, brick outside walls, brick arch and concrete floors. A peculiarity of the latter is a space of three feet between the ceiling and floor beams to allow workmen access to the wiring and piping. All interior partitions are of thin hollow tile, and are intended to be easily removable, to allow changes of the interior arrangement.

There are 6000 persons of both sexes employed in the building. The production of the plant is far greater than that of any other printing establishment in the world; the yearly expenses are over $7,000,000.

It differs in many respects from private printing plants. It embraces every branch and class of the printing and binding business,-- newspaper, magazine, pamphlet and book printing and binding complete; electrotyping, and stereotyping, typecasting, lithographing, process engraving, embossing, etc.

Digitized by the Internet Archive
in 2013

http://archive.org/details/designforgovernm00beyr_0

The character of the work done differs at different seasons of the year. While Congress is in session, from December to March or May, the Congressional Record is gotten out as a daily newspaper. The Patent Office Gazette is issued weekly throughout the year. Numerous special documents have to be gotten out hurriedly at the urgent demand of Congress and all government officers, at a moment's notice; books of all kinds, with bindings rangeing from paper to the most elegant leather are being constantly issued. All of this work requires electrotypes, half-tones, lithographs, etc.; and so it is apparent that the Government Printing Office requires a much larger equipment than a private plant doing the same amount of work in a year would need. It must have a plant capable of meeting these sudden demands.

The establishment is under the direct control of the President and Congress; consequently the the Government Printer, who is the immediate head, is not so much a directing and planning manager as the chief of a private plant, but is merely an executing officer, for whom all questions of policy, practically, are determined by laws. One result of the elaborate system of statutes enacted by Congress for the regulation of the public printing is that much printed matter produced is wasted, and the Public Printer is sometimes hampered from introducing the most modern and approved methods of production. These facts are incidental factors tending to demand an unusually large equipment for the output of the plant.

The Government Printing Office should of course be of the monumental type and character befitting the public instutions and appropriate to the dignity of the nation. The present building is entirely wanting in these respects. The architecture is of a fairly pleasing type, such as is common to the best commercial buildings of the large city, but is manifestly inappropriate to a Government institution. The site is inadequate; there is no approach, no landscape setting, no attempt at anything beyond mere utility. Even on the latter score, however, there are two serious faults. the light court is entirely inadequate, and the height of eight stories is too great for the most economical results in the carrying on of the printing business.

In this thesis the effort is made to give the establishment a properly dignified treatment, such as will comport with the desiderata mentioned above. It is the intention also, of course, to fulfil the requirements of practical utility, in matters of convenience, speed, and economy in the execution of the Government printing.

The establishment will have the following parts:

A. An Administration Department

B. Plant or Establishment proper

C. Power Plant

D. Document Department

E. Accessory and Service Quarters

The layout of a plant both commodious and dignified in ar-

pearance requires much more space than that occupied at present by the Government Printing Office. Considerations of expense at the time the appropriation for the present building was made, were doubtless the controlling reason for building the structure in such cramped quarters and to such a height. In this design the assumption is made that the site can be obtained suitable for whatever plan is most desirable. The necessity for light and lower buildings operates doubly to increase the ground area required, and added to these is the desirability of making the plant adequately large for future growth in production. In addition, departments of the Office now housed in quarters nearby will be included in the establishment in this scheme. Space required for the proper setting of the building and a greatly increased amount of public space will add to the area needed for the site. That occupied by the present building is an excellent location for several reasons; it is close to the Capitol, only six blocks distant, it is close to the new Terminal Station and so posseses convenient railroad facilities, it commands a view to the south of Massachusetts Avenue, one of the most important streets of the city, and fronts upon a park,and it is far enough from the other Government buildings to obviate the possibility of disturbing their occupants with its noise. As this is primarily a utilitarian establishment, having more of the commercial nature than any other department, it is perhaps better in its present location than upon the Mall with the other public build-

ings, which differ from it considerably in character and purpose. Furthermore, on account of its immensity it would detract seriously from the appearance of the other builings near it. It is proposed therefore, to keep the present site and add to it the two blocks immediately North of it, making a total space of 750 feet by 1250 feet available. The grade is fairly level and there are no important buildings on the ground to be removed to make use of the site.

A consideration of the site and its environment, as well as the requirements of the plant itself, have led to the selection of the plan used. This consists of buildings grouped about two enclosed courts, the central feature being the building for the presses, with balancing masses at either end, the Administration Building and the Power Plant respectively. The Administration Building has been placed at the South end, as this is the most important front, and is also nearest the other Government buildings. The Power plant is placed at the other end as being less prominent, and less immediately concerned with the direct processes of Printing. The other principal buildings have been arranged with respect to the successive steps in the processes of manufacture. This arrangement differs materially from the plan of the ordinary large private plants in this country. In large cities, printing plants are forced, as are other commercial establishments, because of expensive and restricted sites, to house themselves in high buildings and to sacrifice natural light to a great extent.

In other cases, firms doing a large book and magazine business have secured locations in small towns or just outside large cities, where the cost of real estate is not such a serious item. Here the rule has been to keep everything on the ground floor and under one roof. The advantages of such a plan are convenience in handling goods, safety in case of fire, and abundance of light. Departments can be grouped together in their most logical and economical arrangement. Vibrations from the heavy machinery are obviated by placing each machine upon an individual foundation. Among the typical plants of this kind are those of the David C. Cook Co. at Elgin, Ill., and the W. B. Conkey Co. at Hammond Ind. They are practically the same in arrangement. There is a two-story office portion, in about the average commercial architecture, a power plant, and the printing plant proper, which is built in one-story bays covered with sawtooth truss roofs, and making no attempt at architectural appearance. They are purely and simply manufacturing plants.

Space in Washington is too valuable for even the Government to afford the site that a plant of this type would require, and the plan is too difficult for dignified architectural treatment. The plan selected is a compromise between the one-story type and the many story type, being four stories high for the most part. Ample light has been secured by the spacious courts and narrow buildings. Masonry bridges join the buildings and permit the passage of vehicles and people below, and afford ample commun-

ication between various departments.

Joining the Administration Building on the West is the building housing the Composing Department or Division, as the official name is. On the first floor is the Monotype Casting room and Electrotype Storage room, as these do not require a great amount of light. On the second or main floor are the Linotype and Monotype Composing rooms. The keyboards of the machines are so arranged that none is more than twelve feet from a window; and as the the windows and stories are extra high, the light is very good. The Hand Composing rooms are on the third and fourth floors, where the lighting is best, with skylights as the main light source on the top floor. On every floor are proof presses, imposing stones and makeup tables, proofreaders' rooms, supply and store rooms, and toilets. The room at the North end on the second floor is for Double keyboard Linotypes, used on special book composition. The offices of the division are located in the South end, being convenient thus to the Administration Building.

An extended comparison between this composing department and those of the larger private plants shows that the Government uses a much larger proportion of machine composition. This is because an unusually large percentage of the Government work is "straight" matter, such as reports, documents, bulletins, The Congressional Record, etc., where there is no variety of type required, and where machine composition is most advantageous. It might be noted that the Monotype casters do not have to be in

immediate connection with the keyboards, as the two machines work separately altogether.

The equipment for this division is given below. The lists for this and the other divisions as well was obtained from the Government Printing Office through the courtesy of Public Printer Mr. John M. Leech. The lists as given herewith follow his list with close approximation.

Monotype Keyboards	216
Linotypes	96
Monotype Casters	150
Proof Presses	40
Cabinets, Hand Composition	200
Imposing Stones	81
Galley Racks	40
Makeup Tables	50
Galley and Furniture Cabinets	60
Electrotype Cabinets	36
Proofreaders' Desks	60

Floor Space:

Monotype Keyboard Room	15000 sq. ft.
Linotype Room	15000
Hand Composing Rooms	60000
Monotype Caster Room	15000
Electrotype Storage Room	15000
Supply and Store Rooms	7000

Proof Rooms	3000 sq. ft.
Proofreaders' Rooms	5000
Book Composition Room	4000
Offices	10000
Toilets, Stairways, Etc.	11000
Total	180000 sq. ft.

The Press Rooms are placed in the central building of the group. The heavy presses are on the second or main floor, which is especially constructed for them. The web and perfecting presses are on concrete pyramids carried down to separate footings. The vibration is thus reduced to a minimum, and economy is secured in the construction of the floor itself, as it does not have to be figured for as heavy a load as if the larger presses were to be supported on it. The central part of the building is open to the roof from the main floor, and as this story has no partitions, the light from the roof and from the large end windows is ample. The side wings are fitted with presses on the main floor and on the next floor above. Paper stock is stored on the two upper floors. The four elevators in this building will be used almost entirely for carrying the paper up and down. The stock is brought in from the railroad subway in the tunnels under the wings, and is unloaded from the car directly to the elevators and lifted to the storage floors. The equipment of the Press Division is as follows:

Boiling Kettles	4

Paper Cutters	10
Roller Washers	4
Presses	
Web Perfecting	9
Automatic	22
Flat Bed	
Two Revolution	64
Drum Cylinder	16
Platen	32
Web	22
Form Benches	8
Floor Space	90000 sq. ft.

The Web Perfecting presses are used in printing the Congressional Record and the Patent Office Gazette, daily and weekly publications, respectively. The other web presses are used in printing large editions of bulletins, documents, etc., the Automatic presses for departmental forms and blanks, the Two-revololution presses for large miscellaneous work, and the Drum cylinder and Platen presses for small work.

On the ground floor of the press building is located the Foundry, where all the stereotypes and electrotypes are made and type are cast. This department is perhaps larger in proportion than in most private plants; it compares with those of large newspaper offices. Here an extensive equipment is necessary for rush work, especially in the equipment for process engraving.

Following is the equipment:

Electro-plating Batteries	8
Beveling and Sawing Machines	12
Black-leading Machines	4
Circular Saws	8
Curving Machines	7
Cutting and Squaring Machines	3
Routers	15
Shaving Machines	20
Proof Presses	4
Molding Presses	11
Miscellaneous	20
Floor Space	60000 sq. ft.

Electrotype Vaults occupy about 20000 sq. ft. of this space and have a capacity of 3000000 plates. The floors for paper stock storage have an area of about 50000 sq. ft. and have a capacity of 5000000 lbs. of stock, sufficient for five months at a time.

In the East building are the Bindery Division, the Money Order Division, and the Lithographing and Map-making Division, as well as the Packing and Shipping Rooms. At present the Government Printing Office has no equipment for lithographing, but it is thought well to include it in this design, as it is the intention of the Government to add this division as soon as practicable.

The Bindery equipment:

Backing machines	8
Casemaking and Covering machines	10
Cutting machines	30
Folding machines	20
Gathering machines	6
Numbering and Paging machines	12
Perforating machines	10
Ruling machines	20
Sewing machines	70
Signature Presses	12
Smashing machines	4
Stamping machines	13
Stitchers, wire	24
Trimmers	16
Miscellaneous machines	12
Floor space, Bindery	115000 sq. ft.

The bindery occupies the second and third floors and the North end of the first in this building. The Money Order Division occupies the South and middle of the fourth floor and the Lithograph Division the North end of this floor. The Money Order Division is kept entirely separate from the rest of the plant on account of the extreme care necessary in conducting it. Very rigid inspection and oversight are employed with all the blanks and forms made up here in order to prevent fraud through the

loss or theft of any of them. The composing, printing and binding is all done here. The location of the division is well separated from the rest of the plant, a very desirable condition. The Lithographing Division can well be placed as it is, because its processes are not dependent upon those of the rest of the plant. The products for the greater part are maps, posters for the recruiting service, colortypes and colorplates as inserts for reports and documents. Embossing is done here also.

The Shipping and packing rooms are at the end of the building connected with the Administration Building. In the latter there is a Postoffice, through which all documents can be mailed directly from the plant, saving thus an immense amount of time, labor, packing, and transportation. The packages for mailing are loaded on mailcars in the tunnel directly below this room.

Floor space, including offices, storerooms, and toilets;

Money Order Division	15000 sq. ft.
Lithographing Division	30000
Shipping and Packing rooms	20000

The equipment of the Money Order Division consists of the following machinery:

Presses	6
Collating and Signature machines	3
Numbering machines	2
Cutting machines	2
Sawing machine	1

The Administration Building, in addition to containing the general offices of the plant, is the part of the plant open to the general public, and is designed accordingly. On the main floor is the grand lobby or "Salle de Pas Perdus", which serves as a museum or exhibit hall of the printing art. This apartment is carried through three stories in height, and has service corridors around it at each floor level. The grand staircases at either end lead only to the second floor, as it is not intended that the floors above should be open to the casual visitor. Space for guides is provided, however, as in all Government establishments visitors are allowed through under proper surveillance. The office suites of the Public Printer and the Superintendent of Documents (the latter a subordinate of the former but having almost as extensive duties) are located on either side of the main entrance. The Auditor's and Cashier's offices for the Document Division are located at either end. At the rear are the rooms of the assignment clerks, through whom the regular copy of the various Government departments goes to be printed. On the next floor are the general timekeeping, costkeeping, and bookkeeping departments.

The fourth and fifth floors are devoted to the Document Division for storage, cataloging, editing, etc. of documents. There is space for the storage of 1,000,000 copies of Government documents on library shelves, this number being kept on hand by the requirements of various acts of Congress. From these, orders

are filled, except in the case of documents printed for immediate distribution. There are kept here, however, copies of all matter whatsoever printed in the plant.

It has been the aim in the design of the plant that the production of a finished book or document should involve the circuit of the plant without retraversing any space. The "copy" comes in through the Administration Division, and after being properly checked , is sent on in turn to the composing room and the press room. In the press room the form receives its additional components from the foundry below and the stock room above. Then undergoing in the bindery the successive processes necessary, with perhaps additions from the lithographing rooms above, the copy, now in its finished form, ~~now~~ returns to the Administration Building or goes to the packing and shipping rooms.

The Service Building is designed for the convenience of the employees. It is not intended nor expected that all the employees should get their noon meal here, but only those who desire to do so, as well as those engaged on night work. The library and recreation room are for ~~the~~ the use of the workers during the noon hour.

The Machine Shop, Carpenter Shop, Electrician's quarters, are located in the building West of the Power Plant. The Stables and Garage for the general service are in the building at the East. The entrances to the plant are placed so as to be convenient of access in any direction, either inside or outside.

Following is the floor space occupied in the three buildings last named:

Administration Building	
Public space	15000 sq. ft.
Document Division	50000
General offices	40000
Post office	15000
Corridors, stairways, etc.	25000
Total	145000 sq. ft.
Service Building	25000
MachineShop, etc.	10000
Garage, stable	10000 sq. ft.

The building for the Power Plant is 70 feet by 240 feet in size. On the principal floor are the boiler and engine rooms. Below the boiler room the space is used for handling and storing ashes. Coal bunkers with a capacity of 5000 tons are located above the boiler room; and have an automatic conveyor hoist which elevates the coal from the car tunnel below. The boilers are of the Babcock and Wilcox type, six in number, 500 H. P. each and set in pairs. The generators are four, of 600 Kw. each, direct connected to the engines. All power used is electric. This plant gives an excellent opportunity for the utilization of electric energy. There are over 1200 individual motors, each machine having its own, and they range from 1-4 H. P. to 100 H. P. Electric heat is used wherever heat is required in any of the manufactur-

in processes, as in the bindery for glue heaters, backing machines, casemaking machines, and covering machines, in the electrotyping rooms and foundry for the beveling and rounding machines. The electric power is used for the elevators, vacuum cleaning system, and for charging the storage batteries of the electric trucks and those used in the electroplating room. The advantages of the individual motor equipment on the machines are many. Long lines of shafting and belting, with the dirt, weight, obstruction to light,noise,and danger to person that they entail are eliminated; power is saved, as machines can be stopped or started quickly and from various points; and the motors can be entirely enclosed within the framework of the machines to which they are attached. The utmost flexibility in the arrangement and rearrangement of machinery is permitted. While the plan of the Power Plant is not in itself the most economical, it fits best in the general scheme, and is conveniently arranged.

For shipping facilities there are four tunnels entering the plant, branching out from the main subway which enters the grounds beneath the Power Plant, and running under the East and West buildings, and under the central building. These give convenient access to the storage quarters and to the mailing and shipping departments.

The construction is of course, fireproof, of reinforced concrete or the Kahn or some similar system. This is an adaptable type and is capable of heavy loading. The floors are de-

signed for a safe load of 250 Lbs. per square foot, except in the Administration Building, Power Plant, and Service buildings. In the Press Room the largest perfecting presses are on special supports, as mentioned before. In all other parts of the plant the standard loading designed for is sufficient. Suspended ceilings are used to allow the running of pipes and conduits between floors. All vertical pipes and conduits are encased in fireproof chases and are free from the supporting members. It might be mentioned in this connection that the wiring in the present plant is not approved by the current Underwriters' rules. Conduits are carried up with the steel columns and are enclosed with them in the same fireproof casing. The brick arch floor construction is of the older type and is too heavy; and has been superseded by stronger and lighter systems.

The columns have a covering of buff or cream enameled brick and the walls a wainscoting of the same, except in the Administration Building, where marble is used. In this building the floors are mosaic in the corridors and hardwood for the rest. In the remainder of the plant the first floor is concrete and hardwood for the floors above. The floors of the Press Rooms are all of concrete, however.

Heating is done by exhaust steam from the Power Plant. The lighting circuit is separate from the power circuit.

The elevator shafts and stairways are in fireproof shafts or walls for their entire height.

The transom lights in all the windows are of prism glass and so insure an abundance of light in the middle of the rooms. The high stories-- fifteen feet from floor to floor-- and the light-colored brick of the interior also contribute much to the same end. It has been the intention to make the interior finish fairly plain and with few moldings, for reasons of cleanliness and sanitation. Cleanliness is important in a printing plant, as soiled stock involves considerable loss.

BIBLIOGRAPHY

The information for the requirements of this thesis has been obtained principally from the Government Printing Office, through the courtesy of Mr. John S. Leech, Public Printer. The elevations, a typical floor plan, and photographs of the construction, together with the report of the superintendent of construction for the present building are found in the Report of the Chief of Engineers of the United States Army for the year 1901. The firms mentioned in the appended list have very kindly furnished the information necessary to determine the amount of floor space required to install the machinery and equipment and also the weight of various machines, which determines the safe working stress to be figured for the floors.

Babcock Printing Press Mfg. Co., New London, Conn., Cylinder presses

Chandler and Price Co., Cleveland, O., Platen presses.

Dexter Folder Co., New York, Folders and press feeders.

Fuchs and Lang Co., New York, Lithographing machinery

Goss Printing Press Co., Chicago, Newspaper presses

Hamilton Mfg. Co., Two Rivers, Wis., Composing room furniture

Geo. A. Juengst and Sons, Croton Falls, N. Y., Collating and gathering machines

Karl Krause, Berlin, Germany, Stamping and embossing

presses and bindery machinery

Mergenthaler Linotype Co., New York, Linotypes

Miehle Printing Press and Mfg. Co., Chicago, Cylinder presses

Lanston Monotype Co., Philadelphia, Monotypes

R. Hoe and Co., New York, Presses and electrotype equipment

Seybold Machine Co., Dayton, O., Cutters, book trimmers, and smashing presses

Van Allens and Boughton, New York, Perfecting presses

E. C. Fuller Co., Bindery machinery

Joseph M. Smyth, Chicago, Sewing machines

W. O. Hickok Co., ruling machines

Latham Machinery Co., Chicago, Wire stitchers

The firms named below courteously furnished much valuable data about their own plants, which are among the largest and most representative in the country.

E. C. Donneley and Sons Co., Book and magazine printing, Chicago

The Lord Baltimore Press, Baltimore, Md.

David C. Cook Publishing Co., Elgin, Ill.

W. B. Conkey Co., Hammond, Ind.

Curtis Publishing Co., Philadelphia

Stafford Engraving Co., Indianapolis, Ind.

Ketterlinus Lithographing Co., Philadelphia

UNIVERSITY OF ILLINOIS-URBANA
3 0112 079093800